

Spot Safety Project Evaluation

Spot Safety Project # 05-03-051

**Spot Safety Project Evaluation of the Flashing Signal Installation
with Vehicle Entering When Flashing Signs
NC 96 at SR 1700 (Brassfield Road) and SR 1709 (Horseshoe Road)
Granville County**

Documents Prepared By:

Hatch Mott MacDonald for

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator

Amy Faulkner

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10-24-2013

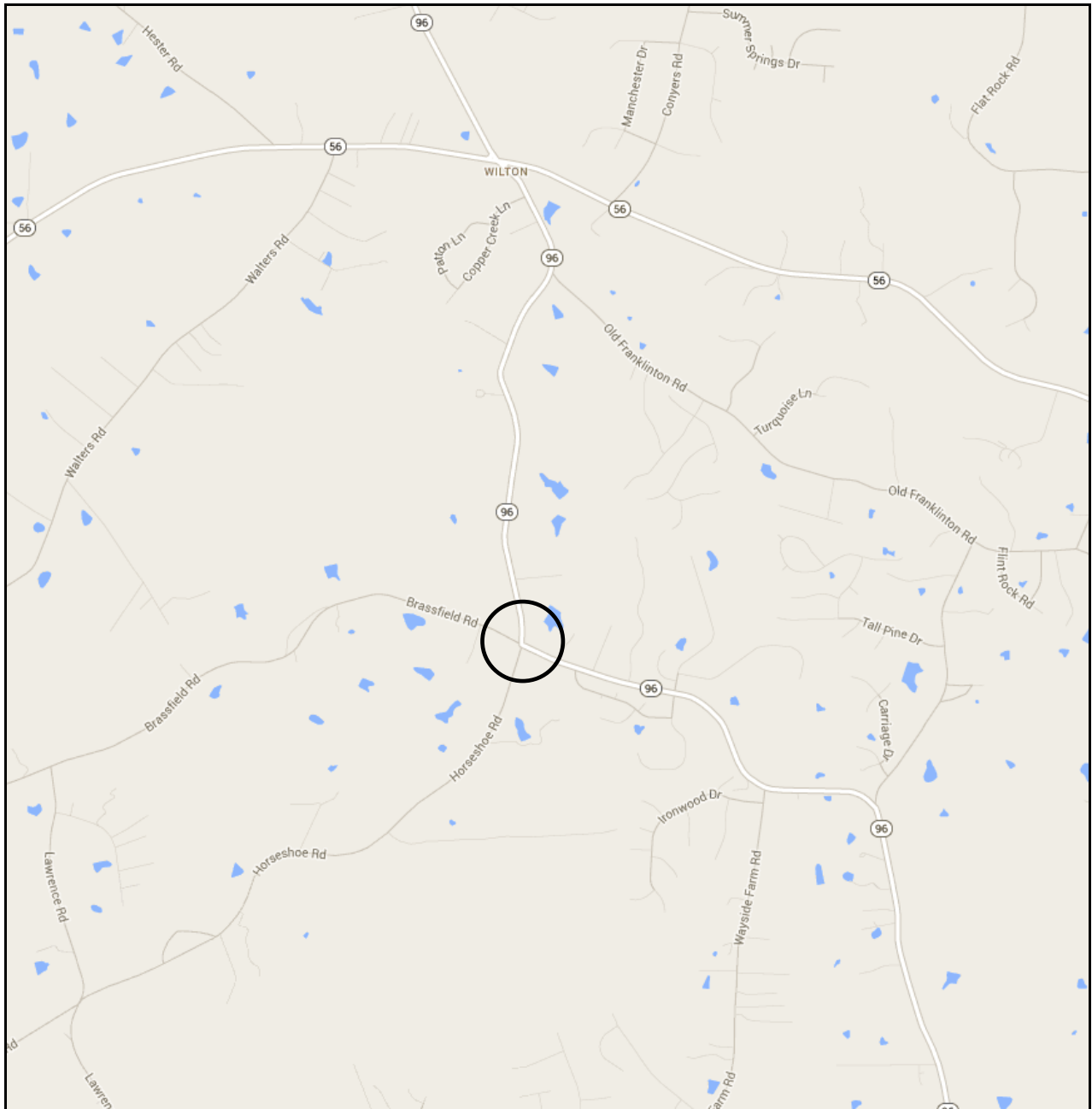
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-03-051 located at the intersection of NC 96 at SR 1700 (Brassfield Road) and SR 1709 (Horseshoe Road) in Granville County.

The signal inventory number is 05-2331 for this two-circuit, actuated flasher.



Map Provided from Google Maps



Aerial Photo Provided from Google Maps

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an actuated flashing signal and accompanying warning signs. The existing intersection was stop sign controlled on the northbound and southbound approaches. There are existing “Stop Ahead” (W3-1) warning signs and rumble strips on the southbound approach. The new flasher installation includes red flashers on the stop controlled approaches and yellow flashers on the westbound and eastbound approaches. “Vehicle Entering When Flashing” warning signs were added in addition to the yellow flashers on these approaches.

The subject location is a four-leg crossroads intersection. NC 96, SR 1700 (Brassfield Road), and SR 1709 (Horseshoe Road) are all 2-lane facilities. NC 96 follows the eastern and northern legs of the intersection. The western leg is SR 1700 (Brassfield Road) and the southern leg is SR 1709 (Horseshoe Road). The speed limit on the eastern leg of NC 96 is 45 mph. The speed limit is 55 mph on the remaining three legs.

The original statement of problem was that vehicles on southbound NC 96 and northbound SR 1709 (Horseshoe Road) could not safely cross the intersection. The initial crash analysis was completed from October 1, 1999 to September 30, 2004 with nine (9) reported crashes. The final completion date for the improvement at the subject intersection was on August 7, 2008 with a total cost of \$25,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period were the months of June through August 2008. The before period consisted of reported crashes from July 1, 2003 through May 31, 2008 (4 years, 11 months); the after period consisted of reported crashes from September 1, 2008 through July 31, 2013 (4 years, 11 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consists of all crashes within 150 feet of the intersection of NC 96 at SR 1700 (Brassfield Road) and SR 1709 (Horseshoe Road) for all approaches. *Please see the above location map and aerial map for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash Types considered are as follows: Left-turn, same roadway; Left-turn, different roadways; Right-turn, same roadway; Right-turn, different roadways; Head-on and Angle.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	5	14	+180.0 %
Total Severity Index	5.44	4.70	- 13.6 %
Target Crashes	4	13	+225.0 %
Target Crash Severity Index	6.55	4.98	- 24.0 %
Volume (2005, 2011)	5600	5300	- 5.4 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	1	1	0.0 %
Class C Injury Crashes	2	6	+200.0 %
Property Damage Only	2	7	+250.0 %

The naive before and after analysis at the treatment location shows a 180 percent increase in Total Crashes, a 225 percent increase in Target Crashes, and a 13.6 percent reduction in the Total Severity Index. The before period ADT year was 2005 and the after period ADT year was 2011.

To further analyze the intersection crash patterns, the following chart shows different traffic movements and the change in crash totals through the study:

<u>Additional Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Left-Turn, Same Roadway (Target)	1	0	-100.0 %
Left-Turn, Different Roadways (Target)	1	5	+400.0 %
Angle (Target)	2	8	+300.0 %
Rear-End	0	1	N/A

Results and Discussion

Referencing the *Collision Diagrams* and the above tables, the Target Crashes (Frontal Impact Crashes) increased from four (4) in the before period to thirteen (13) in the after period. The severity index for these target crash types decreased from 6.55 in the before period to 4.98 in the after period. The study shows a 100 percent decrease in Left-turn, same roadway target crashes from one (1) in the before period to none in the after period. Left-turn, different roadway target crashes and Angle target crashes increased by 400 percent and 300 percent, respectively. Rear-end crashes increased from zero (0) crashes in the before period to one (1) crash in the after period.

Please see the attached *Treatment Site Photos*. Photos are provided from Google Street View for all four approaches to the study intersection. As the Safety Evaluation Group facilitates additional spot safety reviews for these types of countermeasures, it is the goal to be able to provide objective and definite information regarding actual crash reduction factors for these types of treatments.

Treatment Site Photos from Google Street View



Google Maps (May 2012) – Looking South on NC 96 Approach



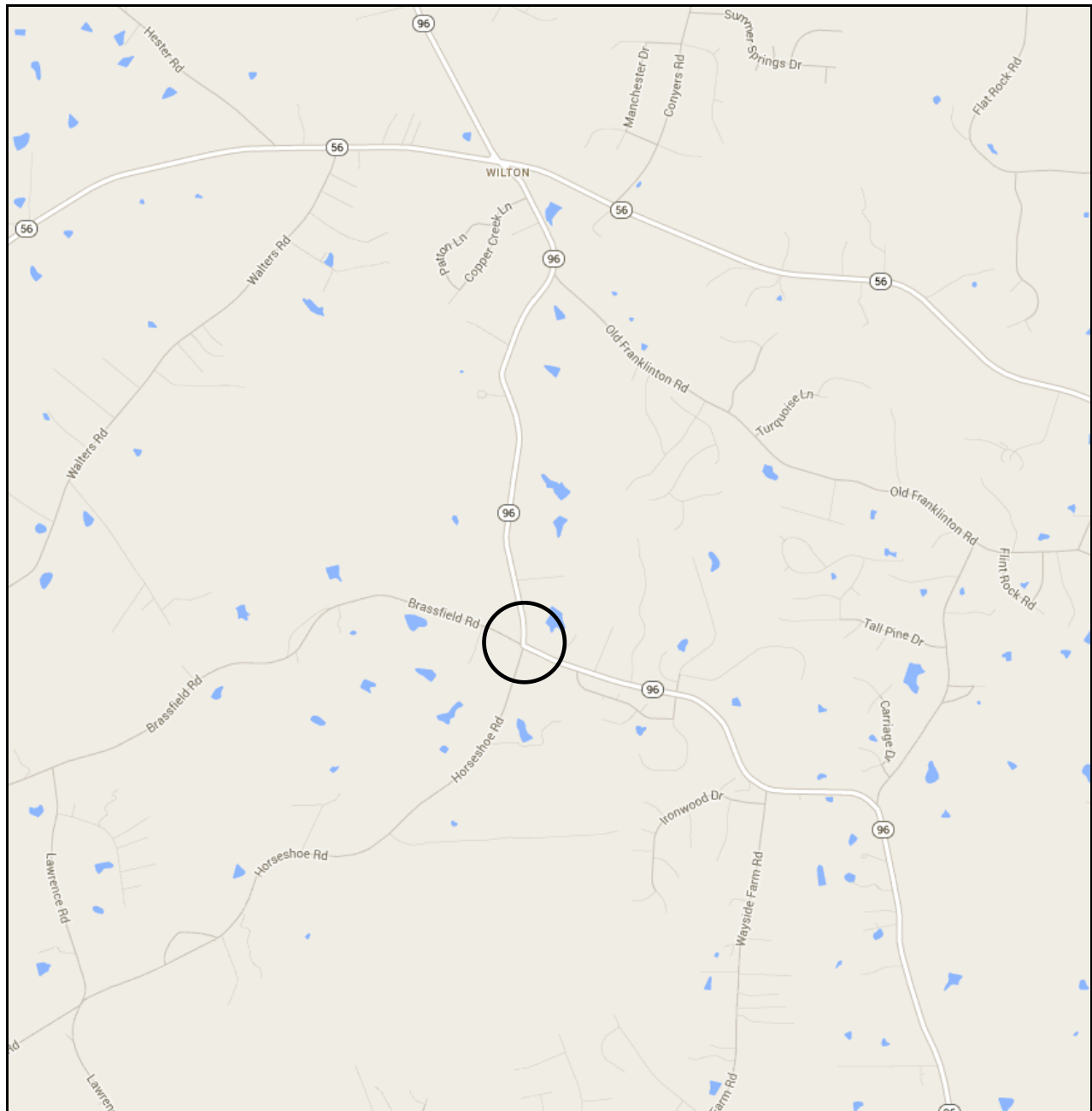
Google Maps (May 2012) – Looking West on NC 96 Approach

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Treatment Site Photos from Google Street View



Google Maps (May 2012) – Looking South on NC 96 Approach



Google Maps (May 2012) – Looking West on NC 96 Approach



Google Maps (May 2012) – Looking East toward NC 96 from Intersection



Google Maps (May 2012) – Looking North toward NC 96 from Intersection



Google Maps (May 2012) – Stop Ahead Warning Signs and Rumble Strips on Southbound NC 96 Approach

SS# 05-03-051
 Granville County
 BEFORE Period
 7/1/2003 - 5/31/2008

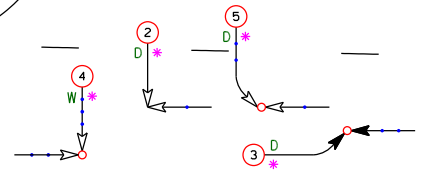


LEGEND							
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		A ANIMAL
	PARKED VEHICLE		TURNING		10 MPH TO 19		P PEDESTRIAN
	PARKING VEHICLE		BACKING		20 MPH TO 29		B BICYCLE
	MOVABLE OBJECT		SIDESWIPE		30 MPH TO 39		T TRAIN
	HEAD ON		INJURY		40 MPH TO 49		* DRIVER AT FAULT
	REAR END		FATALITY		50 MPH TO 59		D DRY
	RAN OFF ROAD		TO AND UP		60 MPH TO 69		W WET
	DAYLIGHT CRASH		SPEED UNKNOWN		70 AND UP		I ICY OR SNOWY
	NIGHT CRASH						O OTHER

NC 96
 55 MPH
 ADT (Year)
 4600 (2005)

SR 1700
 BRASSFIELD ROAD
 55 MPH
 ADT (Year)
 1500 (2005)

NC 96
 45 MPH



Frontal Impact
 Target Crashes

(A) "STOP" Sign (R1-1)
 (B) "STOP AHEAD" Sign (W3-1)

SR 1709
 HORSESHOE ROAD
 55 MPH
 ADT (Year)
 240 (2005)

ADT (Year)
 4800 (2005)

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and
SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 10-16-13 Prepared By: Amy Faulkner, EI



SS# 05-03-051
 Granville County
 AFTER Period
 9/1/2008 - 7/31/2013

NC 96
 55 MPH
 ADT (Year)
 4600 (2011)

SR 1700
 BRASSFIELD ROAD
 55 MPH
 ADT (Year)
 1400 (2011)

NC 96
 45 MPH

ADT (Year)
 4200 (2011)

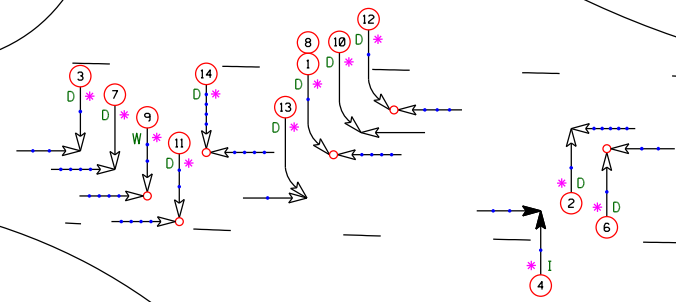
SR 1709
 HORSESHOE ROAD
 55 MPH

ADT (Year)
 350 (2011)



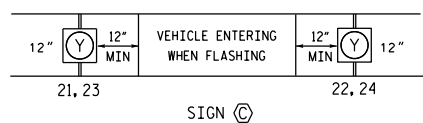
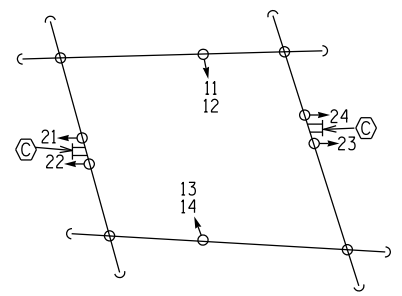
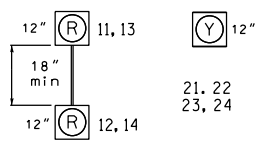
LEGEND							
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	DAYLIGHT CRASH		SPEED UNKNOWN				OTHER
	NIGHT CRASH						

Frontal Impact
 Target Crashes



SIG. INVENTORY NO. 05-2331

SIGNAL FACE I.D.
 All Heads L.E.D.



- (A) "STOP" Sign (R1-1)
- (B) "STOP AHEAD" Sign (W3-1)

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 DIVISION of HIGHWAYS
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 SAFETY DIVISION

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